MECHANICAL ENGINEER

AN EXPERIMENTAL APPROACH FOR STUDYING CREEP BEHAVIOR OF MODEL PLANAR INTERFACES

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An apparatus for measuring the steady state creep behavior of interfaces in aluminum-silicon-aluminum multilayered specimens has been assembled. In the experiment scheme, a double-shear specimen geometry was used to load the interfaces in a state of nominally constant shear. The deformation kinetics for interfacial sliding during constant shear stress creep experiments were measured for various applied interfacial shear stress levels and temperatures. Interfacial shear strain rates were measured using displacement and capacitance gauges. The planar interfaces between the aluminum and silicon layers were prepared by diffusion bonding. Preliminary results indicate that that interfacial sliding occurs via time-dependent relaxation mechanisms and that there is a threshold stress for interfacial sliding, in agreement with previous work on lead-Quartz and lead-nickel interfaces. The preliminary values obtained for the activation energy for interfacial sliding in this aluminum-silicon-aluminum multilayered system is low (~30KJ/mol), and is believed to be due to interfacial diffusion of aluminum atoms. In general, the activation energy is thought to be dependent on the structure and chemistry of the interface.

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